NASA Explorer Schools Project

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PROJECT DESCRIPTION

NASA Explorer Schools (NES) is NASA's flagship middle and high school national education project focused on stimulating STEM (science, technology, engineering, and mathematics) education. NES provides teachers with resources that link classroom learning to real-world NASA activities, offering unique opportunities to directly engage students in NASA's missions and to connect classrooms with expert STEM professionals.

Participation in the NES project offers:

- Searchable **Lesson Library** linking STEM classroom subjects to NASA's innovative research and scientific discoveries
- **Professional development** and support to help educators implement NASA lessons into the classroom
- **NASA Now classroom videos** featuring NASA careers and STEM concepts connected to real-world missions and projects
- NASA experts in classrooms through **monthly online video chats**
- **Collaboration tools** for gathering and sharing ideas and resources with other NES educators and NASA staff
- **Recognition opportunities** for educators, students, or schools for innovative integration of NES teaching materials and exemplary use of best practices in STEM education
- **Live Help Desk** support available to help participants find what they need

NES harnesses the internet and Web technologies to minimize the barriers to participation so that teachers and students—regardless of school type, geographic location, or student demographics—can take advantage of unique learning opportunities designed to inspire student interest in NASA, STEM topics, and related careers.

PROJECT GOALS

Recognizing the importance of engaging students throughout their formative middle and high school years, NES aims to inspire a meaningful interest in STEM topics by providing educational experiences developed around NASA's unique missions. NES works to build teacher content and pedagogical knowledge around NASA resources through professional development delivered across distance learning platforms designed to assist teachers in developing student aptitudes in STEM.
Academic research indicates that learning becomes meaningful when students connect it to their lives and are involved in hands-on activities. To that end, the NES project was

designed to directly involve students in technology and scientific instruments, their community, and with science-interested partners. NES resources and student engagement activities expose students to a variety of STEM careers and give students a sense of relevance by linking STEM classroom topics to real-world NASA activities.

PROJECT BENEFIT TO NASA EDUCATION OUTCOMES

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty.

In the 2011-2012 school year, NES's project offerings centered around three core features that were designed to equip participant teachers with tools and strategies to enhance their STEM curricula:

- **Featured Lessons:** NES offered 39 lessons selected from NASA's vast library of educational products through NES's extensive resource selection process, up from 20 featured lessons available in Y1. The featured lessons are aligned to national standards, promote experiential learning, support a wide range of STEM topics covered in grades 4-12, and include lesson plans and hands-on activity guides.
- **Electronic Professional Development (ePD):** NES paired each featured lesson with associated professional development offerings that provide content knowledge and implementation ideas to facilitate resource use. NES produced an on-demand video collection for each lesson (39 in all) and conducted 103 live professional development web seminars throughout the year. A majority (71%) of web seminars were delivered through the award winning NSTA Learning Center. Through the NSTA Learning Center, NES gained access to 40,000 NSTA member science teachers for recruitment and participation in NES activities. In 2012, NES teachers recorded 526 uses of the live ePD sessions and 210 uses of the on-demand professional development videos, for a total of 736 ePD uses.
- **NASA Now Classroom Videos:** In the 2011-2012 school year, NES developed 42 new weekly video segments highlighting current NASA missions and careers to help students engage in NASA's work and research and provide real-life context for classroom STEM topics; coupled with the 42 archived videos from the 2010-2011 school year, teachers had access to 81 NASA Now classroom videos in 2012. In 2012, NES teachers recorded 792 uses of NASA Now classroom videos.

PROJECT ACCOMPLISHMENTS AND CONTRIBUTION TO PART MEASURES

Over the course of the 2011-2012 school year, NES was very successful in both recruiting a broad base of teachers and motivating them to participate in NES project offerings. Participants in the project were a geographically diverse set of educators that represented a broad range of learning. In 2012, NES recruited more than 3,000 educators from over 2,400 schools to participate in the project.

Overview: NES Participation Snapshot	
No. of NES Participants[1]:	3,114
No. of "NES Teacher" Participants[2]:	3,067
No. of Schools:	2,456
No. of Students[3]:	341,464
No. of NES Activities Completed:	2,705

NES Participant Data	
No. Teachers at Elementary School (grade 4):	293
No. Teachers at Middle School Level (grades 5-8):	1,773
No. of Teachers at High School Level (grades 9-12):	961
No. of Teachers Crossing Levels:	40
% Teachers Representing Underserved Schools[4]:	39% *(1,216)*
% Teachers Representing High Minority Schools[5]:	38% *(1,168)*
International Representation:	Romania, Nicaragua, Germany, United Kingdom, Spain, Japan, Portugal

Notes:
1. Total no. of teachers who have registered on the Virtual Campus
2. "NES Teacher" include all active participants (not special access users); NES Teachers are able to submit activity surveys
3. Total no. of students based on teacher estimates documented on NES registration forms
4. Underserved schools defined as schools where more than 50% of the student population receive free lunch
5. High minority schools defined as schools where more than 50% of the student population are minorities

NES participants represented classrooms from grades 4-12, covered all STEM subjects, and came from rural, suburban, and urban areas across all 50 states. Additionally, NES had an international presence in Department of Defense or State Department schools in Romania, Nicaragua, Germany, Spain, Japan, Portugal, and the United Kingdom. NES teacher participants completed more than 2,700 NES activities throughout the year and dedicated thousands of hours to inquiry-based NASA content.

To supplement the three core project features, NES offered additional opportunities for participants to engage with STEM professionals, such as monthly live video chats that allowed students to pose questions directly to NASA experts and gain insight into STEM-related careers. NES also highlighted supplemental educational and multimedia resources from across the agency to offer ideas for continued engagement with STEM topics. These unique and authentic NASA resources provided students with a sense of relevance and involvement by linking STEM classroom topics to real-world NASA activities.

In 2012, NES recognized a diverse set of NES participants and provided them with exclusive opportunities to visit NASA centers, interact with NASA's scientists and engineers, and build their STEM content knowledge.

- **Teacher Recognition:** This year, NES invited 50 innovative and active educator participants to attend an all-expenses-paid unique NASA research workshop designed to expand their content knowledge and provide them the opportunity to network with fellow educators.
- **Student Recognition**: NES invited 30 teams of students to its National Student Symposium. Teams were selected based on their demonstrated interest and

aptitude in STEM topics, and the symposium was held at the Johnson Space Center May 2-5, 2012. Students were selected from a pool of schools who participated in Virtual Symposium in which students presented research findings to panels of experts through collaborative technology.

- **School Recognition:** NES selected 39 educators from 14 different schools for its School Recognition Award. NES began by identifying educators who collaborate with other teachers in their schools to bring NES materials and activities to a broad student population, and they invited schools with two or more of these highly engaged teachers to submit an application describing their collaborative school-wide implementation efforts. NASA offered the 39 selected teachers a trip to the Johnson Space Center in January 2012, where they conducted experiments in microgravity aboard the agency's reduced gravity aircraft.

In addition to these formal recognition structures, NES also celebrated teachers who demonstrated innovative uses of NES resources. Every month, NES selected User Generated activity submissions that exhibited the project's "Strategies for Success" (curriculum integration, student engagement, technology usage community engagement, and parent involvement) and featured them on the NES *Merit Roll*. The *Merit Roll* showcased highly engaged NES teachers and shared their strategies for success with other participants.

In addition to receiving positive feedback from teachers, NES was recognized by a number of industry and educational organizations in 2012

- **Bright Ideas:** The Ash Center for Democratic Governance and Innovation at Harvard named the redesigned NASA Explorer Schools Project as a Bright Idea under their Innovations in American Government Award Program. Bright Ideas are promising new government programs, practices, and ideas selected by a review panel of evaluators.
- **NASA Now Emmy:** The National Academy of Television Arts & Sciences Lower Great Lakes Chapter awarded an Emmy Award to NASA Now. The Regional Emmy recognizes excellence in local and state-to-state television. NASA Now was honored with an Emmy in the Informational/Instructional Program/Series or Special category. The series was judged on two episodes, "Icing Research" and "Exercise in Space."

These awards validate the project's relevance in the broader STEM education realm and publicly acknowledge NES's contribution to STEM educator opportunities.

IMPROVEMENTS MADE IN THE PAST YEAR

In 2012 NES designed a set of improvements to the Virtual Campus (known as the VC 2.0) to enhance the NES participant experience, increase NES's value in STEM classrooms, and encourage increased participant engagement with NES. NES developed these enhancements using participant feedback gathered through online surveys, an assessment of NES progress in implementing recommended improvement actions from 2011 NES Lessons Learned, the summer 2011 Virtual Campus usability test, and the 2012 Midyear Lessons Learned Analysis. The VC 2.0 features major changes to improve the user experience and to increase participant engagement in two ways: (1) New navigation paths for access to resources and (2) Refined data tracking mechanisms. The improvements, designed to enhance the user experience and address persistent participant engagement concerns, are focused around three major areas of the Virtual Campus: the homepage, the *My Activities* page, and the search functionality.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

A majority of NES professional development content is delivered through the NSTA Learning Center. The award-winning NSTA Learning Center provided access to 40,000 NSTA member science teachers for recruitment and participation in NASA educational offerings. NES integrated the project's Virtual Campus with the NSTA Learning Center to leverage the strengths of both resources. NES also offered educators the opportunity to earn up to two free Continuing Education Units through Oklahoma State University.